Appendix 12-3: Regional Long-Term Annual Trends in Biscayne Bay (1980–2005)

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INTRODUCTION

The following section summarizes long-term annual average water quality parameters for each of the six sub-regions of Biscayne Bay: Oleta River, North Bay, Miami River, North-Central Bay, South-Central Bay, and South Bay (**Figure 1**). The water quality parameters are ammonium, nitrate plus nitrite (NOx), total phosphate (TP), turbidity, and salinity. Miami-Dade County Department of Environmental Resource Management (DERM) water quality samples were collected at various depths at various times. Data was available most consistently for samples collected at a depth of 1 meter (m) and are therefore used to examine long-term annual water quality trends (**Figures 1** and **2**). However, because salinity data at 1-m depth were unavailable for water years (beginning in May and ending with April of that water year) prior to 1988, salinity data is averaged throughout the water column (i.e., averaged for all depths for all stations). Regional data is averaged for all stations within each of the six sub-regions (**Table 1**). Data is reported as annual averages over the course of the typical water year.

Table 1. Biscayne Bay water quality regions and DERM water quality sampling stations.

Oleta River	North Bay	Miami River	North-Central	South-Central	South Bay
BB01	BB05	BB19	BB27	BB36	BB45
BB02	BB06	BB22	BB28	BB37	BB46
BB03	BB07	BB23	BB29	BB38	BB47
BB04	BB09	BB24	BB31	BB39A	BB48
	BB10	BB25	BB32	BB41	BB50
	BB11	BB26	BB34	BB42	BB51
	BB14		BB25	BB43	
	BB15			BB44	
	BB16			BB53	
	BB17				
	BB18				

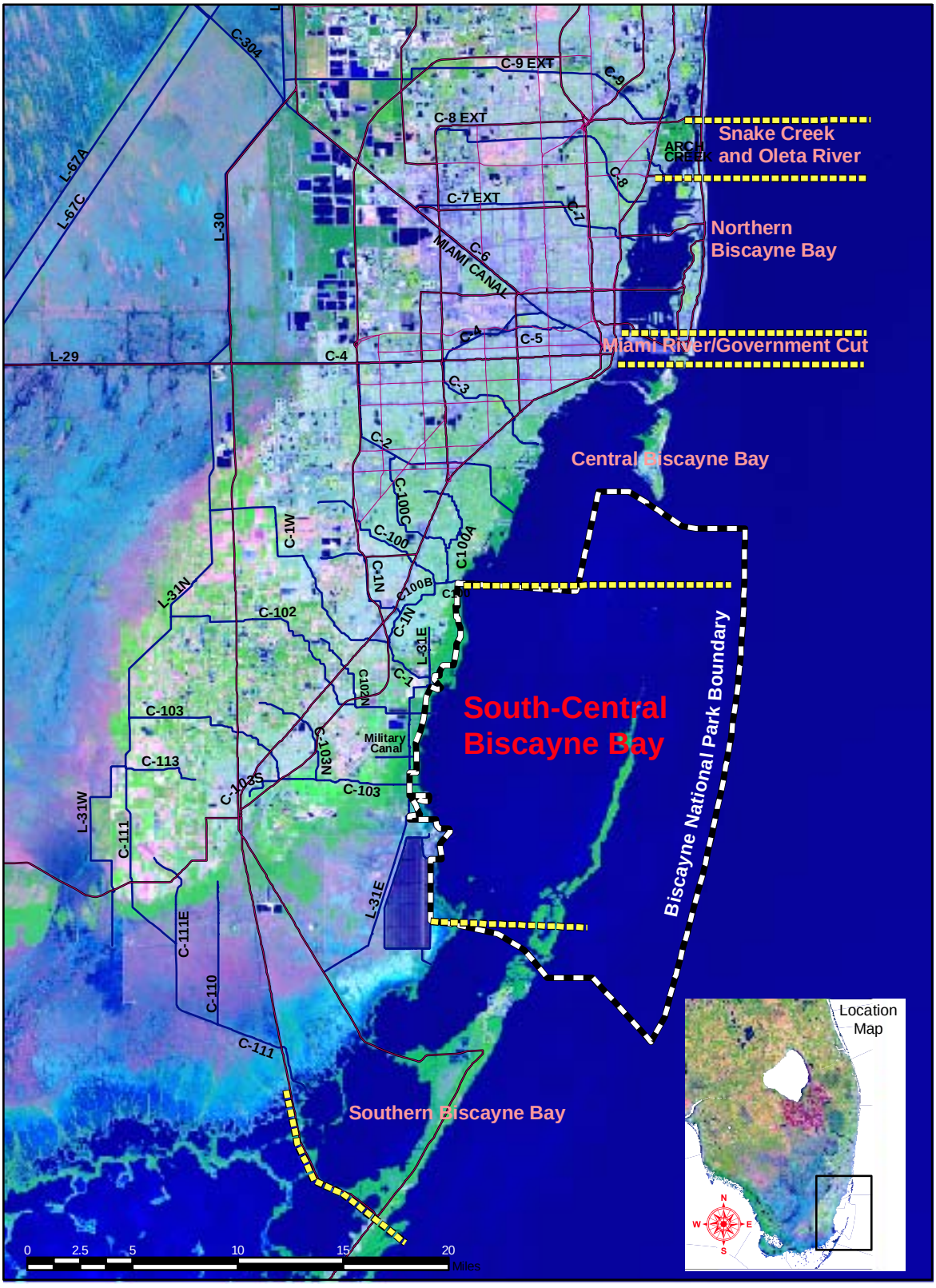

Figure 1. The geographic location and approximated sub-regions of Biscayne Bay.

LONG-TERM ANNUAL TRENDS

Total freshwater flows into Biscayne Bay from canals were generally greater in the northern regions (Oleta, North, and Miami River regions) relative to the southern regions, particularly since 1990 (**Figure 2**, Panel A). Long-term mean salinities were inversely lower in the north and higher in the south, with the exception of salinities in the South Bay region, where annual average salinities were more consistent with the northern regions from 1993 through 2004 (**Figure 2**, Panel B).

Mean ammonium nitrogen concentrations were similar for all regions of Biscayne Bay, and show no long-term trends for the period of record prior to Water Year 2001 (WY2001). Since WY2001, ammonium concentrations have steadily increased in all regions of the bay (**Figure 3**, Panel A). Mean nitrate plus nitrite-nitrogen nitrogen (NOx), total phosphorus (TP), and turbidity all exhibited slight decreasing long-term trends for the period of record (**Figures 3**, Panels B–D). Although NOx concentrations were significantly higher in the Oleta River region, the interannual pattern of NOx in the Oleta River region was similar to patterns observed in other regions of Biscayne Bay for most years (**Figure 3**, Panel B). The regional trend in TP concentration was higher in the north and lower in the south (**Figure 3**, Panel C), similar to the regional trend observed for freshwater canal flows into the bay (**Figure 2**, Panel A). Mean turbidity also exhibited a regional trend from high in the north to low in the south, with the exception of the Oleta River region (northern most region), where turbidity values were similar to those observed in the North-Central Bay region (**Figure 3**, Panel D).

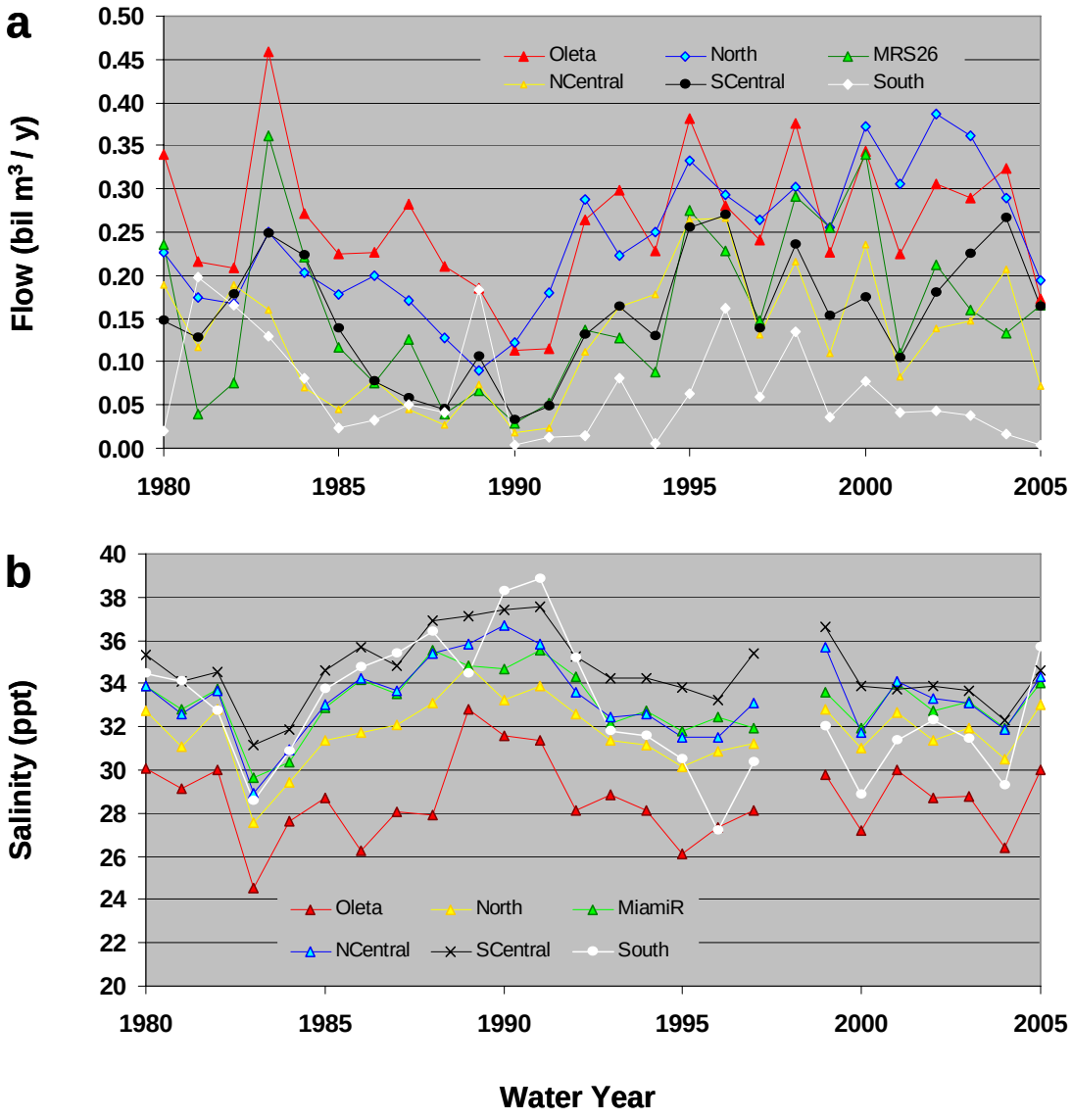

Figure 2. Long-term regional average annual values for (A) freshwater canal flows into sub-regions of Biscayne Bay and (B) salinity within each sub-region of Biscayne Bay.

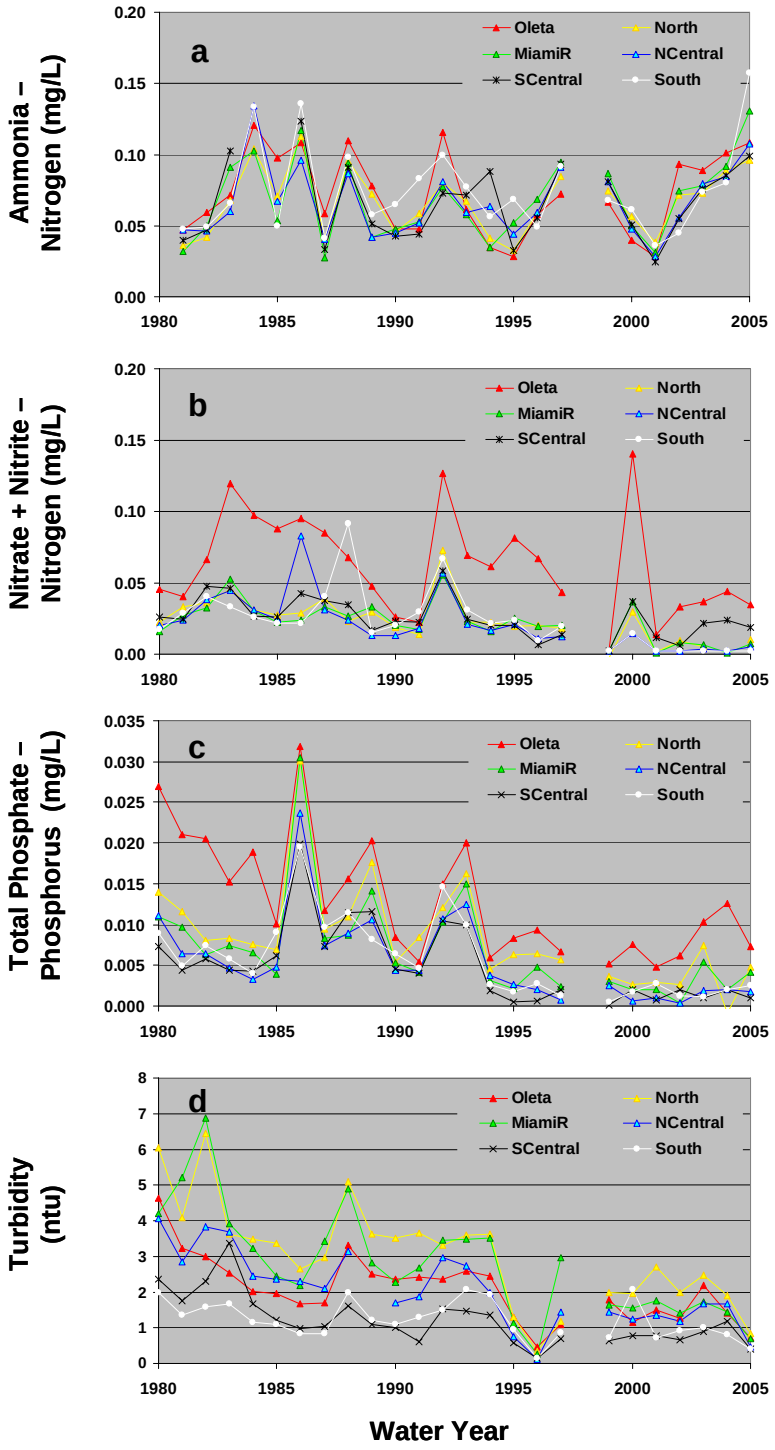

Figure 3. Regional average annual values for inorganic nitrogen: (A) ammonia, (B) nitrate plus nitrite, (C) total phosphate phosphorus, and (D) turbidity within Biscayne Bay.